

***Integrated CNS Technologies  
Conference & Workshop***

# **Architecture Options for Integrated CNS**

**30 April 2002**

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**Manager – System Architecture  
Command, Control, Communications & Terrestrial Segment**

**Air Traffic Management**

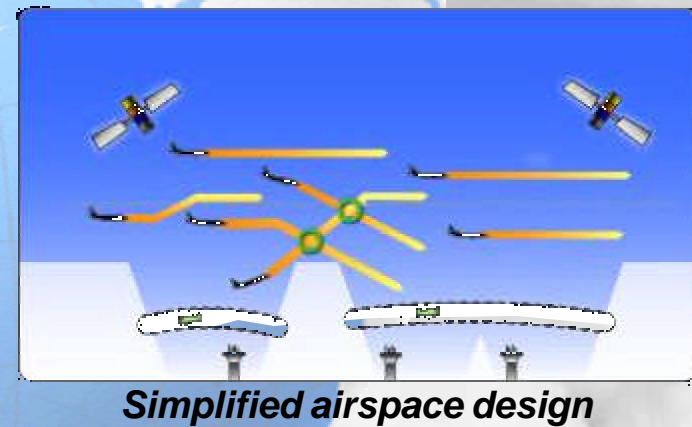
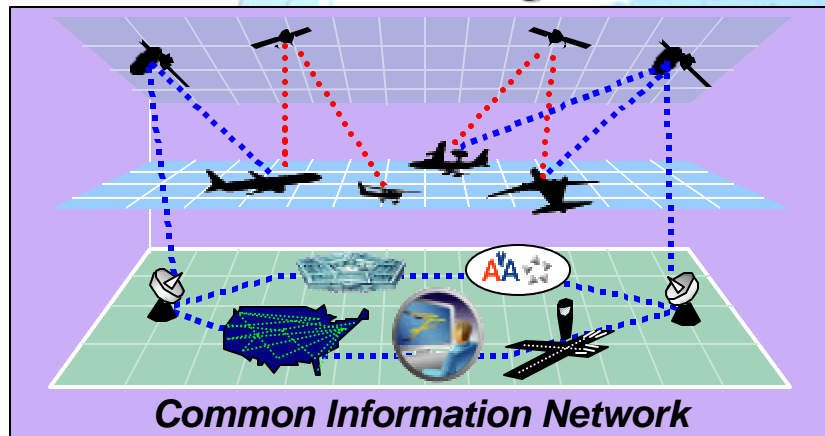
# Outline

- **Boeing Vision**
- **Integrated CNS**
- **Common Information Network (CIN)**
- **Open Architecture**
- **Benefits**

# Vision: Revolutionary Architecture



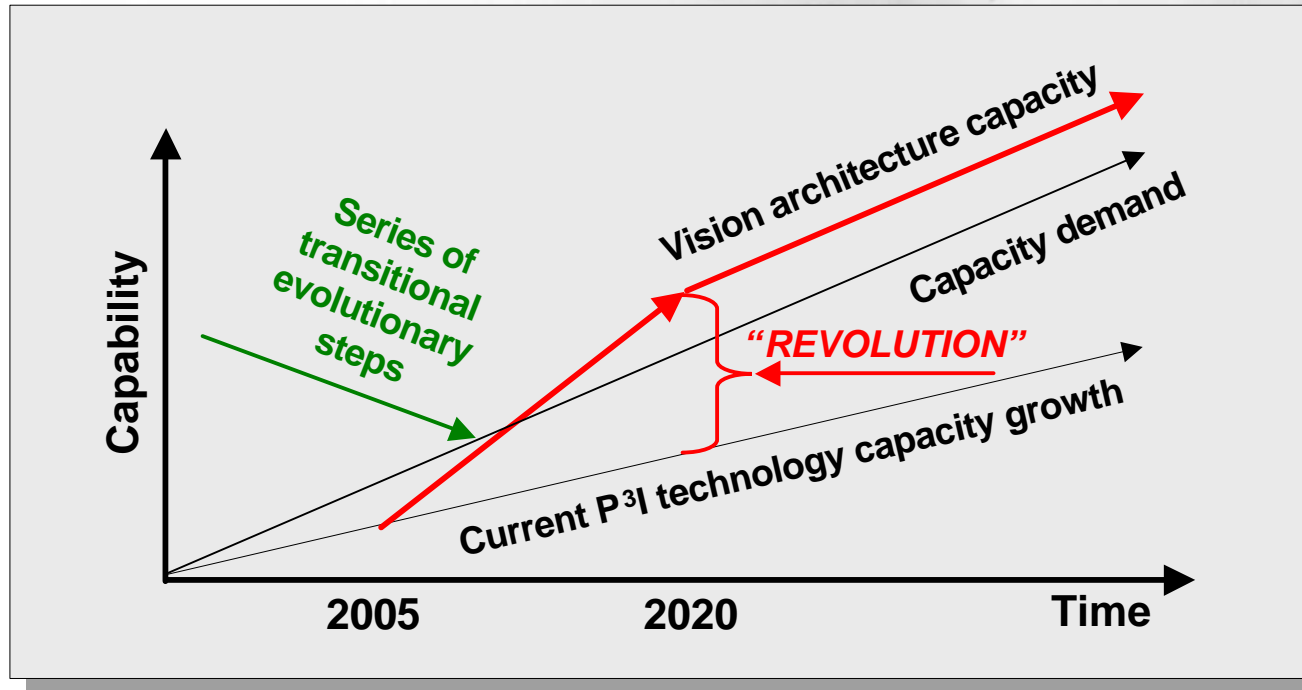
## *Integrated total system solution*



- “Layered” security approach
- Open system principles—growth for the future
- Phased transition plan—builds on existing plans



# ATM Revolution Definition



**Stepwise improvements at quick pace  
—integrated in a “system of systems” approach—  
build to a revolution in capability**



# Global Integrated-CNS System

Comm' | Satcom

GPS

ATM Space System

Galileo

Global

ATM

Infosphere

ATC Centers

Common  
Information Network

Airports

Airline  
Operations  
Centers

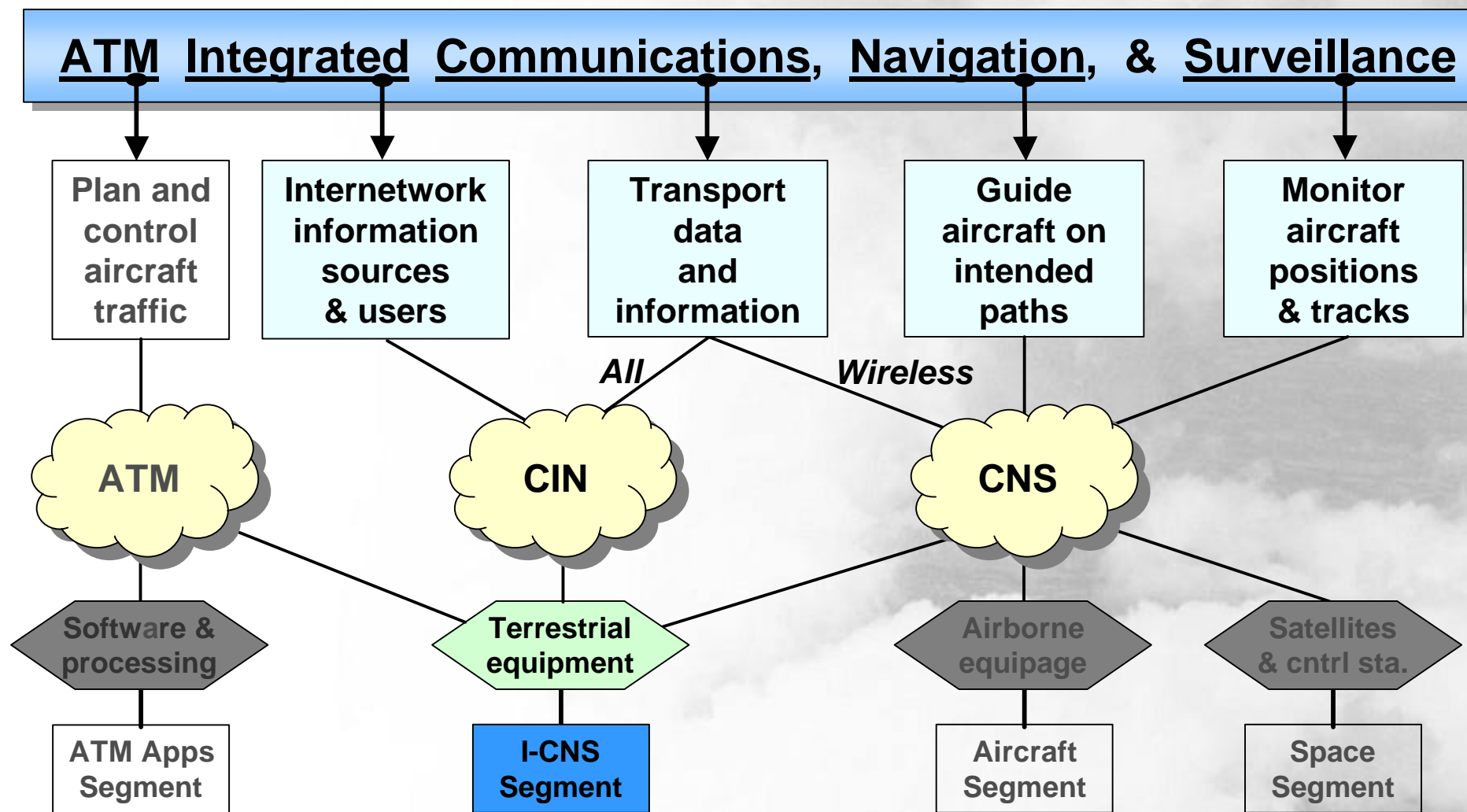
Information  
Centers

Network  
Operations  
Centers

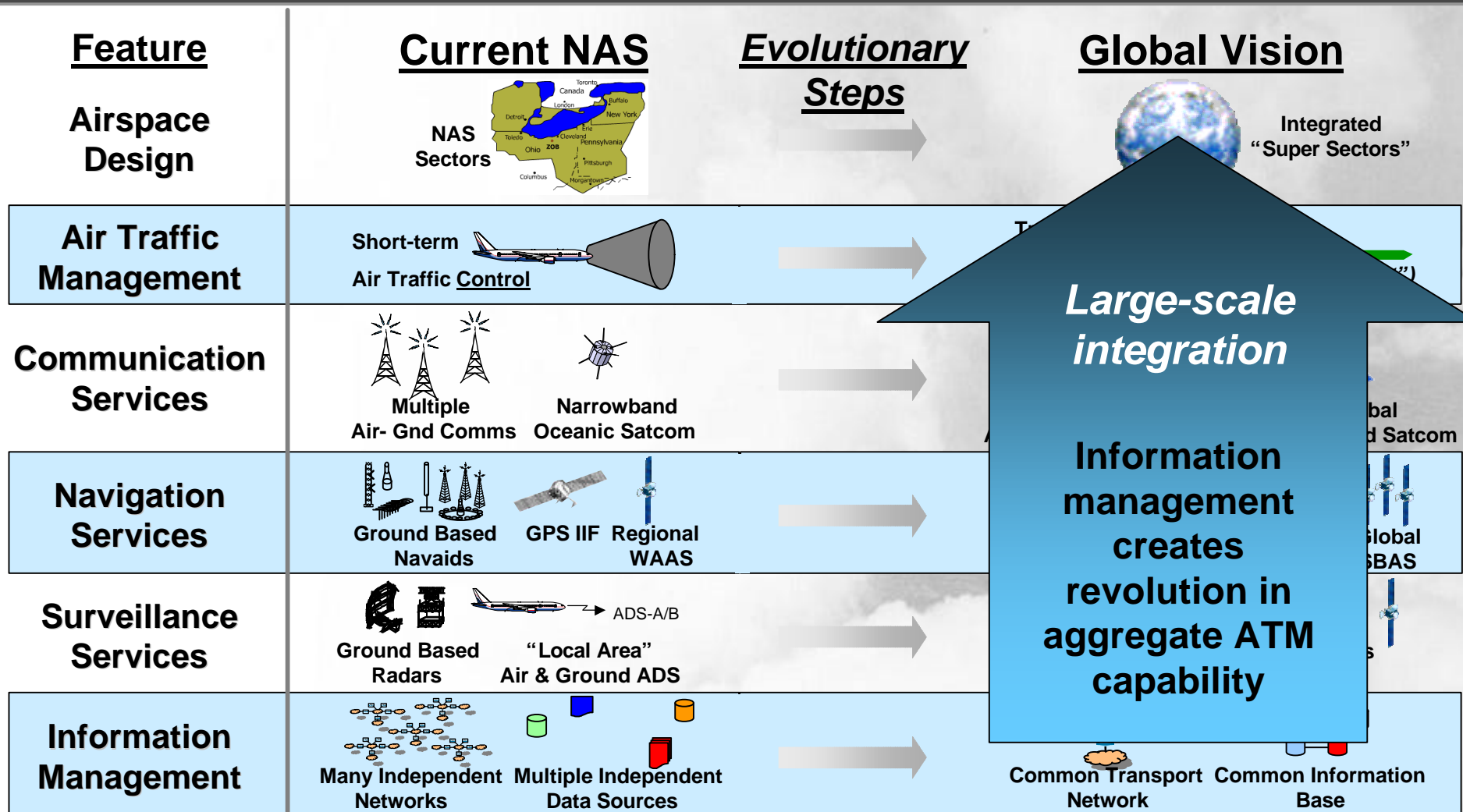
Satellite  
Operations  
Centers

Air Traffic Management

# I-CNS Functional Scope

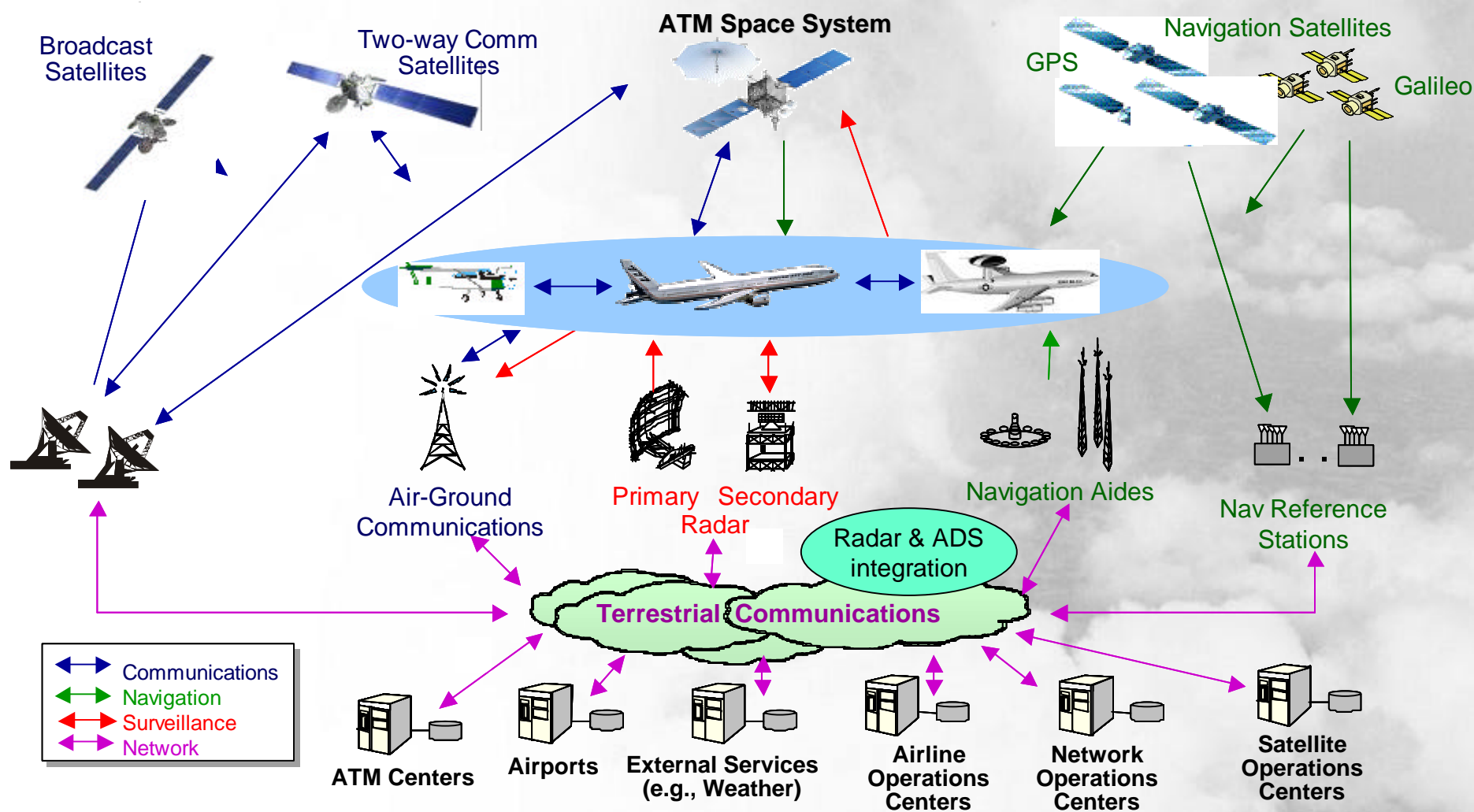


# ATM Architecture Evolution





# Vision Architecture— Integration of C, N, & S



# Common Information Network Tenets

- ***End-to-end communications globally for both terrestrial and airborne elements***
- **Encompasses air-to-ground data-links**
- **Integrates ATM-relevant networks**
- **Aircraft networks will be IP-capable**
- **IPv6 will be widely deployed in world's networks**

# Common Information Network Components

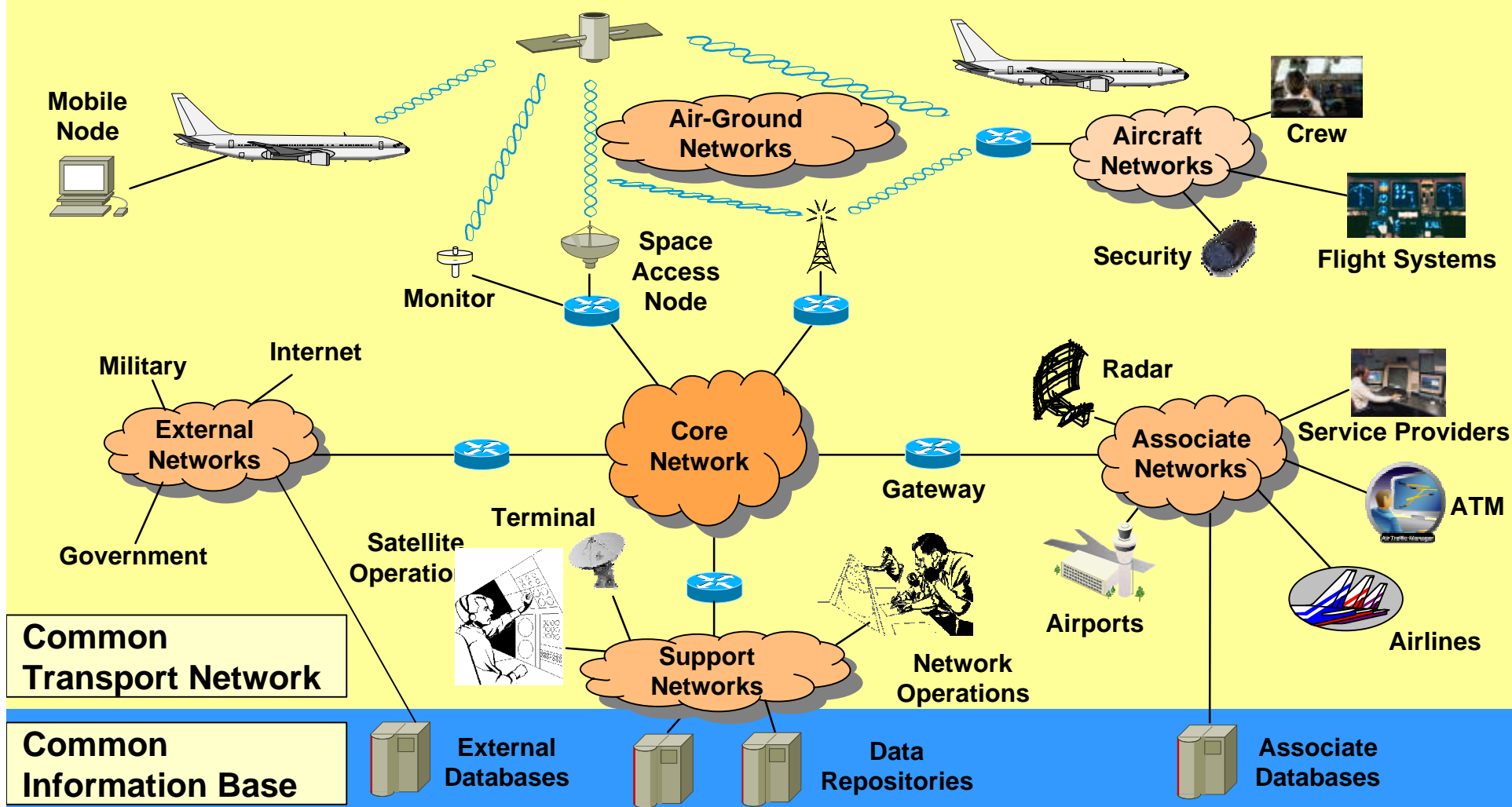


**Common Transport Network**  
*Communications internetwork*

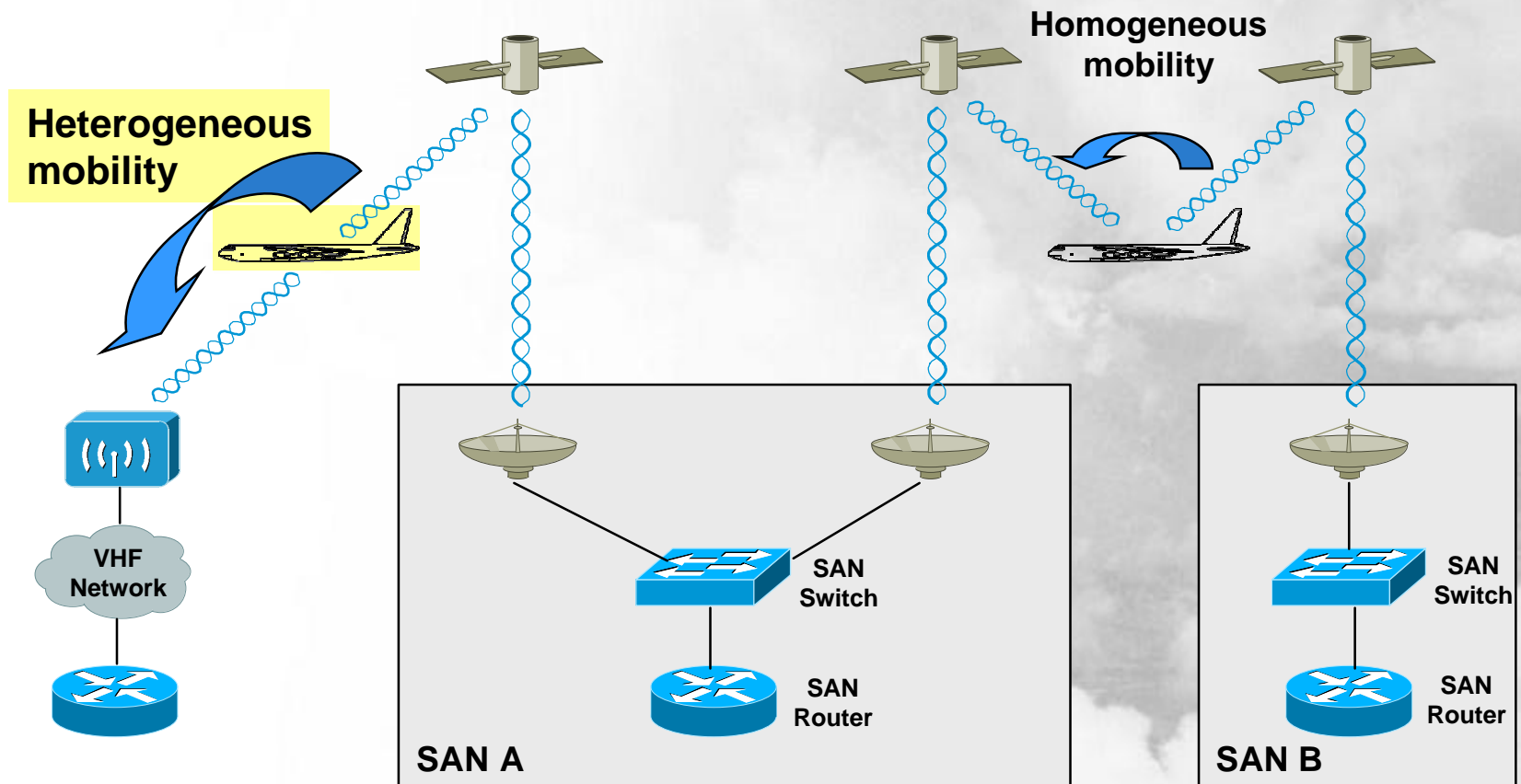
**Common Information Base**  
*Distributed information warehouse*



# CIN – A Network of Networks

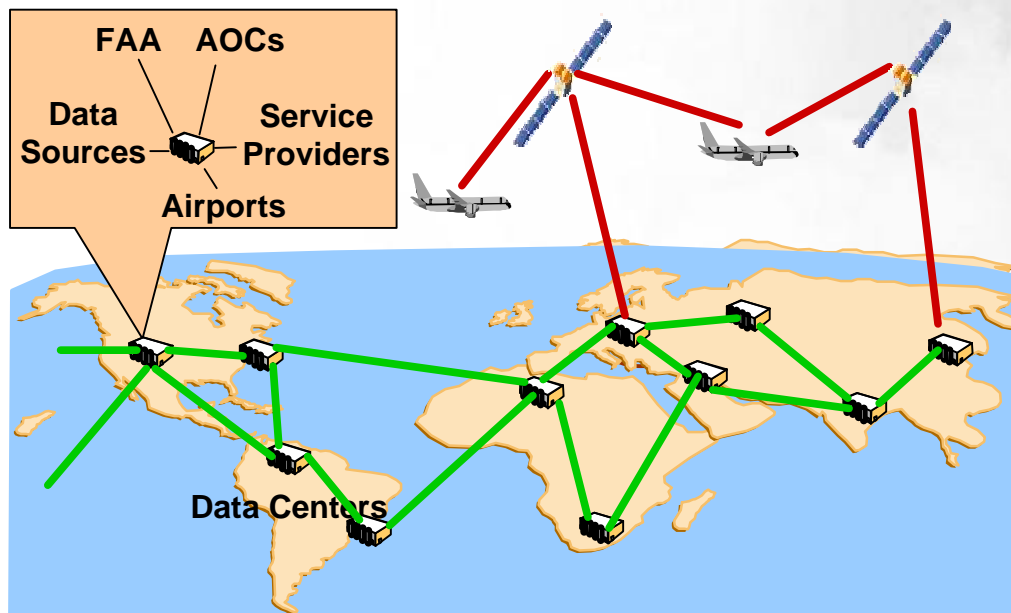


# Comm Service Providers Essential



***Heterogeneous mobility scheme relies on 3<sup>rd</sup>-party relationships***

# CTN Attributes

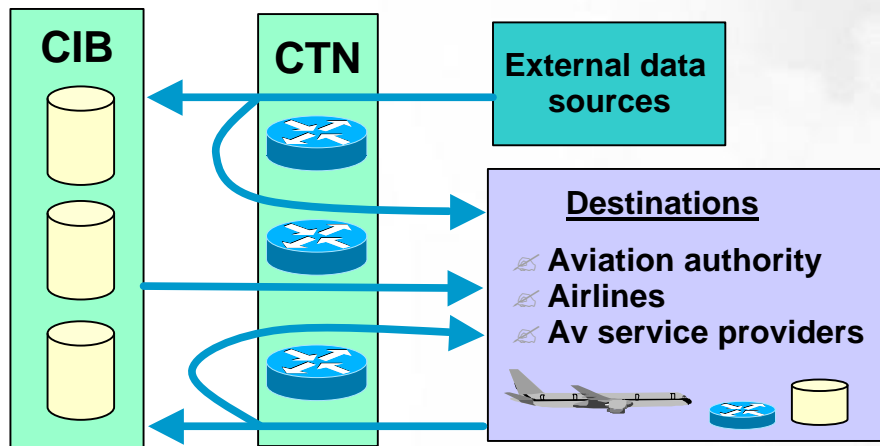


- Global, ubiquitous coverage
- Secure communications
- Open architecture
- Common off-the-shelf technology and standards
- Data-centric, with voice also
- Controllable quality of service
- Dynamic bandwidth management
- Mobility
- Multicast

***CTN interconnects ATM information sources and users***



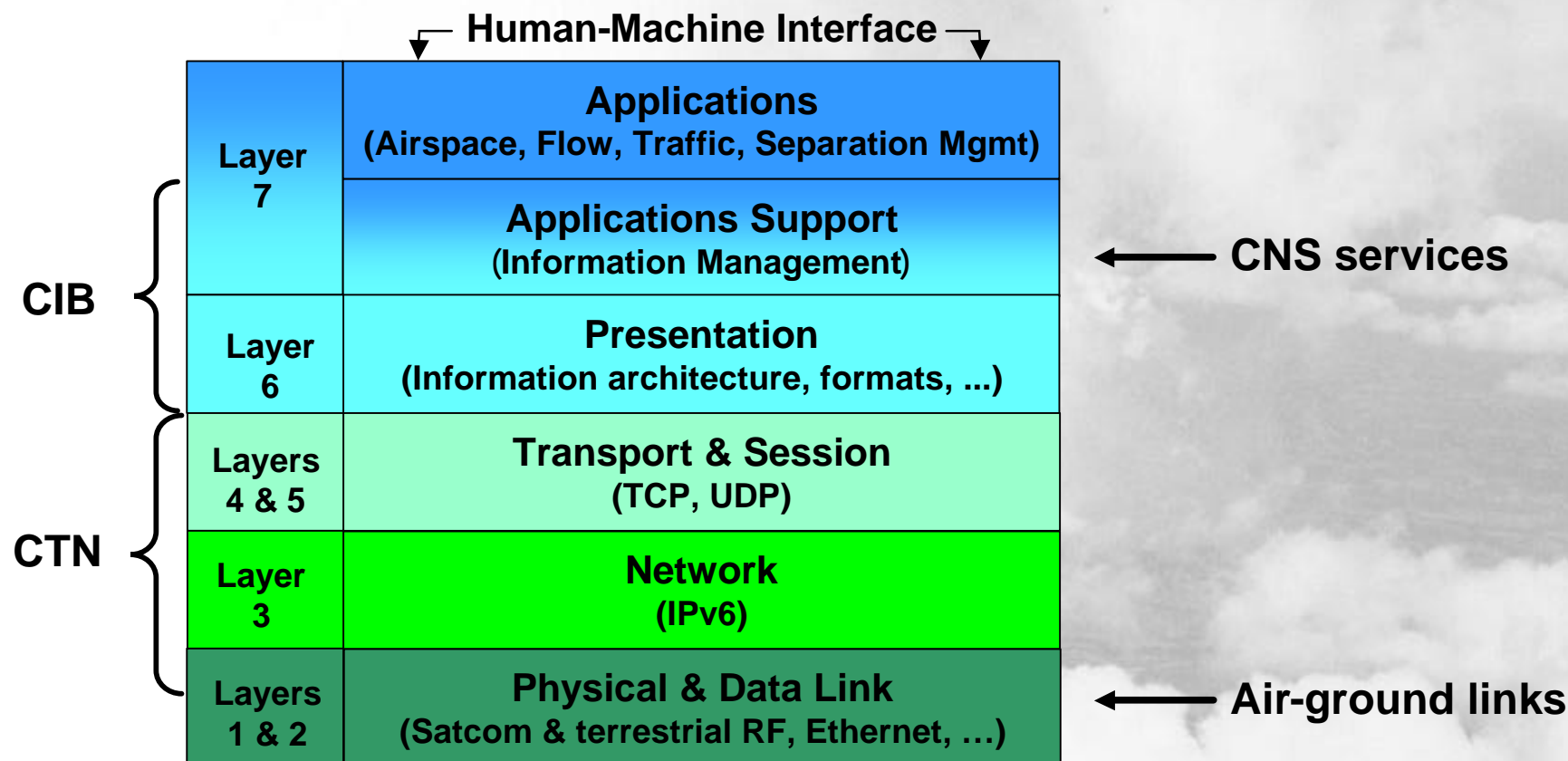
# CIB Attributes



- Cooperative information system
- Virtual data warehouse
- Publish & subscribe paradigm
- Standards-based data distribution for robustness and scalability
- Data controlled by parties responsible for content
- Information assurance
- Multi-level security and access control

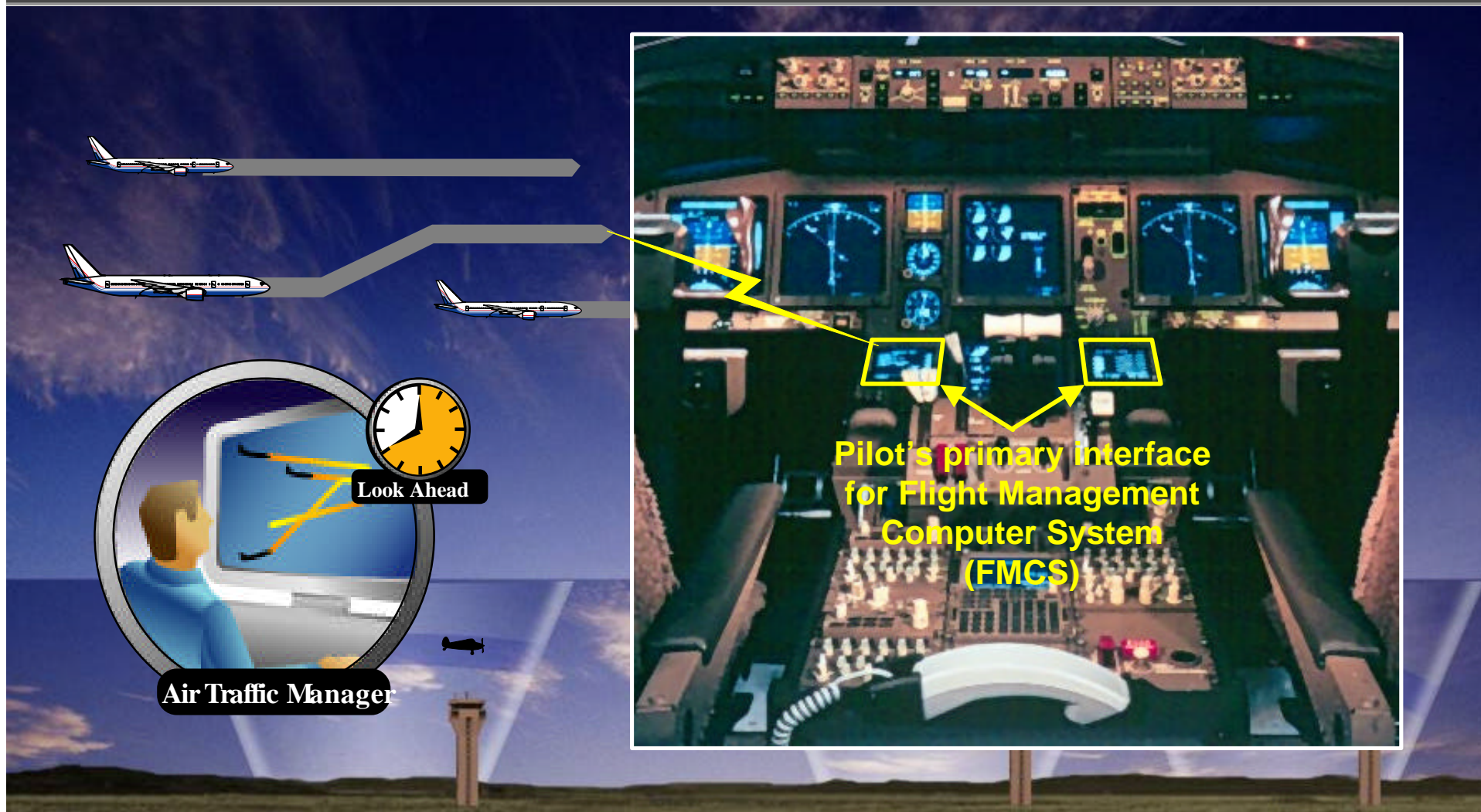
***CIB supports ATM applications***

# CIN Open Architecture



*Use of industry standards minimizes risk and cost*

# Common Information Network in the Cockpit





# Integrated-CNS Benefits

<i>Attribute</i>	<i>Benefit</i>
<ul style="list-style-type: none"> <li>• Global system with open, standards-based architecture</li> </ul>	<ul style="list-style-type: none"> <li>• Worldwide infosphere accessible to all</li> <li>• Affordable implementation</li> </ul>
<ul style="list-style-type: none"> <li>• Worldwide voice and data comm</li> </ul>	<ul style="list-style-type: none"> <li>• High situational awareness for safety and security</li> </ul>
<ul style="list-style-type: none"> <li>• Integration of available comm links, narrowband and broadband</li> </ul>	<ul style="list-style-type: none"> <li>• Robust critical communications</li> <li>• High data rate available when necessary</li> </ul>
<ul style="list-style-type: none"> <li>• State &amp; intent of aircraft always available</li> </ul>	<ul style="list-style-type: none"> <li>• Aircraft track monitoring for security</li> <li>• Rapid trajectory deviation correction</li> </ul>
<ul style="list-style-type: none"> <li>• Navigation corrections and integrity broadcast (e.g., WAAS and LAAS)</li> </ul>	<ul style="list-style-type: none"> <li>• Increased enroute and airport capacity</li> </ul>
<ul style="list-style-type: none"> <li>• Multiple CNS capabilities accommodated</li> </ul>	<ul style="list-style-type: none"> <li>• Affordable equipage for all aircraft classes</li> </ul>
<ul style="list-style-type: none"> <li>• Functional and geographic diversity, with autonomic fault resolution</li> </ul>	<ul style="list-style-type: none"> <li>• Robust operations</li> <li>• Low vulnerability to attack</li> </ul>

# Summary

- **Evolutionary transition to revolutionary architecture**
- **Large-scale system integration**
- **Shared awareness by a Common Information Network**
- **Automated decision aids integrate information sources**